Prediction of Vapor-Liquid Equilibria for the Binary Systems Containing Hydrofluoroethers Using the ASOG Group Contribution Method

K. Tochigi, K. Yoshida, and K. Ochi
College of Science and Technology
Nihon University
1-8 Surugadai, Kanda, Chiyoda-ku
Tokyo 101-8308 Japan

J. Murata and M. Yasumoto
Research Institute of Innovative Technology for the Earth
1-1, Higashi, Tsukuba
Ibaraki 305 Japan

T. Sako
National Institute of Materials and Chemical Research
1-1, Higashi, Tsukuba
Ibaraki 305 Japan

One of the authors (K.T.) has conducted continuous research on the development of ASOG which is one of the group contribution methods for predicting activity coefficient and phase equilibria including vapor-liquid equilibria. The azeotropic mixtures composed of hydrofluoroethers and solvents will have useful properties as alternative refrigerants. This paper deals with the extension of applicability of ASOG to hydrofluoroethers in order to find the azeotropic systems. However, there were only a few vapor-liquid equilibrium data that were needed to determine the ASOG group pair parameters. Our group has the project for measuring the vapor-liquid equilibria for six binary systems ($CF_3(CF_2)4CF_3$ + $CF_3(CF_2)_6CF_3$, $CF_3(CF_2)_3CH_2CH_3$ + octane, $(CF_3)_2CFOCH_3$ + heptane, $CF_3CH_2OCH_2CF_3$ + butyl ether, $(CF_3)_2CFCF_2CF_2CF_3$ + $CF_3(CF_2)_6CF_3$, $CH_3OCH(CF_3)_2$ + methanol). The group pair parameters relating to the CF_3, CF_2, CF, CH_2, O, and OH groups have been determined using the measured vapor-liquid equilibrium data. By using the parameters, we will be able to find azeotropic mixtures composed of hydrofluoroethers and solvents (alcohols, ethers, etc.).